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HERPETOLOGICA

Established 1936
Organ of the HERPETOLOGISTS LEAGUE, A. A. A. S. Associate
Published and Edited by Chapman Grant
2970 Sixth Ave., San Diego 3, California

Vol. 3 March 5, 1947 Part 5

John Treadwell Nichols—Founder of Copeia

JOHN TREADWELL NICHOLS

John Treadwell Nichols was born in Jamaica Plain, Massachusetts, in 1883; graduated from Harvard in 1906 and since 1907 has been associated with the American Museum of Natural History in the field of ichthyology. He has published over 900 papers of which about 2% have been herpetological. This percentage in no way represents his interest in our field, because in 1913 he founded "Copeia" and later the A. S. I. H.

In a recent letter he told the Editor that Old Timers who might be interested in hearing about him are now relatively few. He mistakenly thought that the rising generation of herpetologists might not be interested. In the same letter he said: "Ichthyology and Herpetology are different sciences, their association merely a marriage of convenience, or inconvenience."

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1921 The snapping turtle's egg (editorial note, unsigned). Forest and Stream, September, 1921, p. 401.

1933 Further notes on painted turtles. Copeia, 1933, pp. 41-42.
J. T. Nichols and C. Ralph De Sola. The probable size maximum of *Chrysemys picta picta* (Schneider). Copeia, 1933, p. 151.

1939 Data on size, growth and age in the box turtle, *Terrapene carolina*. Copeia, 1939, pp. 14-20.
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Notes on the Mud Turtle

By J. T. NICHOLS

In the Nineteen-twenties, prior to the opening of Moriches Inlet, the waters of Moriches Bay were brackish, and those of mainland creeks bordering on this bay at Mastic, Long Island, N. Y., essentially fresh. Here the Mud Turtle *(Kinosternon subrubrum)* was common, and I find several items in my journals which may contribute to our knowledge thereof.

The smallest individual recorded was found on June 29 (1919) resting near the surface of the water on a mass of fine-leaved pondweed. Its carapace measured only 24 mm., its plastron 19 mm. in length. The carapace was a little flatter than in the adult, its shell still soft, and it presumably had hatched from the egg that spring. In color its carapace was black with a series of straw-colored spots on the lower free margin, just visible from above. The plastron was reddish horn color, with a black central area whence black projections radiated to the margins along the scale junctures, excepting junctures at the cross-hinge, which was a little in front of its center. Body and legs were black, with obscure pale markings on the lower part of the head and neck.

All the following items refer to one shallow creek with bottom of deep mud, and to a narrow dirt road at slightly higher level running along its westerly and southerly bank, a half mile or more, from its narrow head to a slightly projecting point, with an open area of sparse grass and slight slope to the water, where it has opened to a broad basin which, in turn, communicates with the bay by a narrow inlet. The varying short distance between road and creek is grown with trees and brush.

The largest Mud Turtle recorded was 111 mm. (straight) carapace length, found at the edge of the creek, July 8 (1934). It had a "claw" on its tail, probably a male.

The earliest individual found active was on April 11 (1925). It behaved very differently from several Painted Turtles which were swimming actively about beneath the water, now and then one sticking its head out. It was picked up from the surface of the upper part of the creek, and "when dropped in the water again, withdrawn in its shell, it sank to the bottom. Here it slowly opened up, came to the surface, and swam towards shore with the top center of its shell just out of water, awash. Close to shore it submerged completely and worked along the bottom beneath the very shallow water until it came to rest against the bank." Possibly this behavior had to do with its having recently come from hibernation, away from the water (see Wetmore and Harper, 1917, Copeia, No. 45, p. 56).

On June 5 (1921) "came across a good-sized Mud Turtle, its back green with alga, which buried itself in the water weed and loose mud at the base of same, at the bottom [of the creek], a couple of inches down out of sight but readily reached by hand. Several times it was taken again and liberated, immediately hiding in this manner, working in horizontally a shell's length or two before coming to rest, its exact

position determinable by watching the loose bottom heave over it as it went in. When I reached down and touched its carapace it attempted to go no deeper, and when liberated over mud practically free of vegetation, it swam away along the bottom, its head and neck stretched out in front, until it came to a weedy place. Was surprised that it did not enter the actual mud, of which there was certainly an abundance, more freely and to greater depth."

The latest individual found active was on November 11 (1934), out in the dirt road (perhaps seeking a place to hibernate).

On April 19 (1930) there were a pair of Mud Turtles near the shore of an embayment in the creek, "the male with head and arching neck out of the shallow water, mounted on the female which was entirely down in the mud."

There are two records of a female found laying eggs, June 25 (1922) at about 11:45 A.M., on the grassy point, and July 13 (1924), when the sun came out for a time in the latter part of the morning of a showery day, in the dirt road not far away. In both cases I took pains not to disturb her, came back later and found the excavations filled in, in the first instance only a slight soil roughness, in the second a bit of raised, loose earth, showing where they had been. From the first 6 eggs were unearthed from a depth of about 4 inches. They "had chalky shells" and "were translucent pinkish white in color," measuring, 5 of them 25 x 14 mm., one 22 x 13 mm. From the second there were 4 eggs at a depth of 2½ to 2¾ inches, fragments of a fifth which likely was broken in digging them out. They had "hard, smooth shells with the polish of ivory," were "pinkish white," and measured 24 to 25 x 14 to 16 mm. Unlike the spherical eggs of the Snapping Turtle and the papery or leathery-shelled eggs of the Painted Turtle, the ellipsodial eggs of this species might almost pass for those of a bird, were they somewhat less variable in size and proportion.

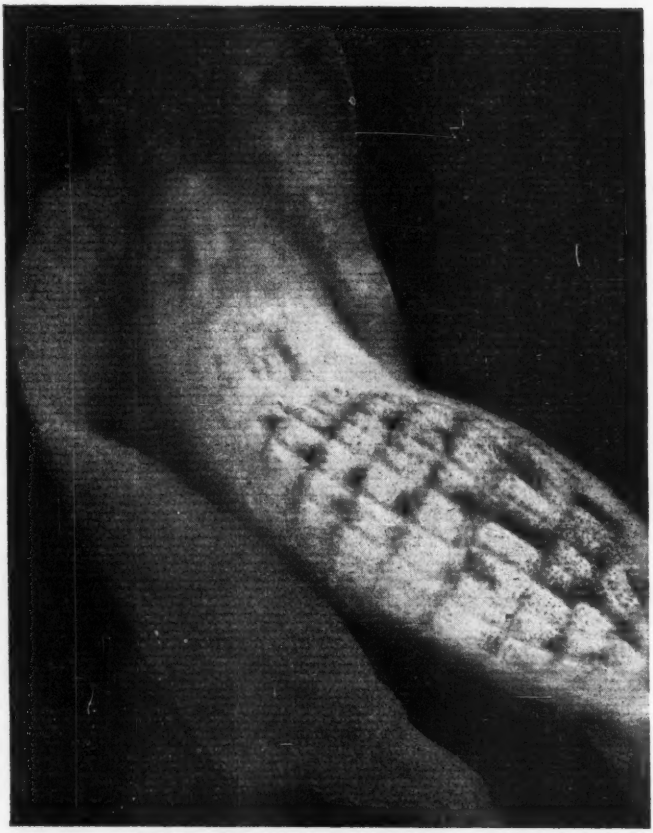
Both of these sets of eggs were reburied, out of doors, but so that they could be kept track of. One of the June set, opened October 15, "contained a well formed live embryo turtle about equal in size to the remaining mass of yolk and occupying less than one half the space within the eggs, carapace roughly 15 mm. long." In one of the July set opened November 15, "the well formed embryo turtle occupied about one half its content, the yolk the other half." Obviously, in this locality Mud Turtle eggs do not hatch before the following spring.

Individuals which very likely had come ashore to deposit eggs were recorded on the grassy point where the June nest was situated on May 30 (1921); and at about 9:15 A.M., cloudy and warm with a hazy sun, June 27 (1925). Such were recorded at various points along the dirt road on May 30 (1926), in adjoining brush, at about 8:15 A.M., sunny; June 13 (1926), prior to 10 A.M., burning off misty after rain in the night; August 1 (1925), at about 5:30 A.M., clearing after a rainy night; August 12 (1933), at about 9:30 A.M., turtle wet as though fresh from the water, sunny and warm, but it had rained the preceding evening.

AMERICAN MUSEUM, NEW YORK CITY

A Case of Cannibalism in Captive *Xantusia vigilis*

By E. M. HEIMLICH *and* M. G. HEIMLICH



Tail as found in stomach. Longitudinal incision in stomach wall shows scale detail of ingested tail. Above, region of distended cardiac valve; laterally at left, lobe of liver; at right, mesentery; lower right margin, pyloric valve.

During the course of embryogenic studies (conducted under Dr. R. B. Cowles) on the Yucca Night Lizard, *Xantusia vigilis,* a case of cannibalism was encountered.

Specimens collected from the Joshua Tree area of Morongo Valley, San Bernardino County, California, were being held in captivity for periodic removal of female reproductive tracts. On May 27, 1946, toward the end of the spring copulative period, ten specimens were dissected for ova or developing embryos. In one of these a tail was found in the digestive tract of an individual whose own tail was intact.

These specimens were being held in standard 10" x 12" aquaria, approximately twenty individuals to each tank. Ample open water supply was provided in each, and feedings of termites and meal worm larvae *(Tenebrio molitor)* were supplied every two days.

The tail (see illustration) was encountered lying with its base at the pyloric valve of the stomach and its tip in the upper pharynx. The stomach was completely filled and distended, and the esophagus was likewise expanded to accommodate the bulk of the posterior portion of the tail. The cardiac valve was completely obscured.

Inasmuch as the tail was found base end down in the digestive tract, there can be little doubt that it had been disengaged from its owner previous to ingestion. No accurate estimate as to the time of ingestion can be ventured from the position or degree of decomposition of the tail, but it is assumed that the event occurred no more than a few hours previous to the dissection.

Whether the tail had been freshly discarded and active when eaten, or was discarded in combat, cannot be ascertained. However, prior refusal of the captive specimens to eat small pieces of fresh meat supplied them would indicate that actively motile material alone would serve as an adequate stimulus for ingestive reactions. If this is true, their persistent refusal to eat the larger grubs furnished them (of but half the size of the tail) makes this an even more curious occurrence.

UNIVERSITY OF CALIFORNIA AT LOS ANGELES

ROSS ALLEN'S REPTILE INSTITUTE

Mr. Allen and Mr. Holbrook Scott have been zealous in furnishing names and addresses of interested persons with the result that many new members have been added to the League. Our zeal for securing new members is not financial, but the larger the distribution of Herpetologica,

The better will be the MSS. submitted. As with the AAAS, our greatest source of new members is from names suggested by present members. Please cooperate in this. Your efforts will be rewarded by your receiving a constantly improving Herpetologica.

Range Extension of *Natrix kirtlandii* in Ohio

By JOHN THORNTON WOOD *and* WILLIAM EDWARD DUELLMAN

Conant, in The Reptiles of Ohio., Amer. Midl. Nat., 1938, pp. 75-76, summarizes the distribution of *Natrix kirtlandii* in Ohio, stating that while the species cannot be considered common, it has local abundance in at least two areas. One of these two areas is in the vicinity of Cincinnati, Hamilton County, Ohio, at the southern end of the Miami Valley. The only other published records from the valley record the species from Oxford, Butler County, and Lake St. Mary's, Auglaize County.

North of Oxford, and south of Lake St. Marys, in the block of nine counties which form the northern half of the Miami Valley, the authors have collected specimens in scattered locations in Montgomery, Clark, Greene, and Logan Counties. This area, approximately 75 miles square, is the largest gap in the northern and southern distributions of *Natrix kirtlandii* in Ohio.

Locality records as follows:

No. County	*Locality*	*Collector*	*Date*	*Museum*
2—Clark	Crystal Lake	Larry Miller	10-22-46	DPLM
1—Greene	Xenia	James Martin	4- 4-41	DPLM
5—Logan	Indian Lake	W. E. Duellman	6-11-45	WED(1)
			9- 1-45	WED(1)
			9- 2-46	WED(2)
2—Montgomery	Dayton	W. E. Duellman	9-16-45	WED
		Richard Knotts	9- 4-46	WED

Total specimens examined: 10; preserved: 6.

No centers of local abundance have to date been found in the areas mentioned. All specimens were taken in the daytime under cover, possibly indicating the species is locally nocturnal during at least spring and fall months. Conant, p. 76, found a number of specimens in the open, but the majority under boards and stones.

None of the specimens taken was found in water, with the exception of the Clark County specimens on which specific collecting data is not available. *Natrix kirtlandii* is by far the most terrestrial member of the genus *Natrix* observed in upper Miami Valley.

Largest specimen examined: 16¼"; smallest, 8⅜". All specimens, at time of capture, were aggressive as described by Conant, p. 76, excepting that strikes were not always ineffectual. The snakes were not large enough to puncture the skin of the collector's hand, but one specimen secured his teeth on six occasions when striking.

In this area *Natrix kirtlandii* has been found in association with the following members of Miami Valley herpetofauna: *Natrix s. sipedon, Natrix septemvittata, Thamnophis s. sirtalis, Storeria dekayi, Coluber constrictor (c.-flaviventris), Rana catesbeiana, Rana pipiens, Rana clamitans, Acris crepitans.*

ANTIOCH COLLEGE, YELLOW SPRINGS, OHIO, and
DAYTON SOCIETY OF HERPETOLOGY, DAYTON, OHIO

Pituophis m. melanoleucus in the Great Smoky Mountains National Park Area

By JOHN THORNTON WOOD

King's detailed paper and addition on the herpetology of the Great Smoky Mountains National Park area do not mention the possibility of the occurrence of *Pituophis m. melanoleucus*. Ditmars, and Stejneger and Barbour, on the other hand, do include it in their very general statements.

Mr. Verne Boring collected a specimen on May 21, 1946, near the Abrams Creek Ranger Station close to the park boundary. On some maps this site is designated as Happy Valley, Tennessee.

Mr. R. L. Kathe and the author took the following data:

Female; total length, 114.2 cm.; tail, 16.8; percent. tail, 14.7; ventrals, 220; caudals, 54; body blotches, 31; tail blotches, 7; scale rows, 27-29-22; supralabials, R-8, L-8; infralabials, R-11, L-12; oculars, R, 1-4, L, 1-3..

This specimen is preserved in the study collection of the Great Smoky Mountains National Park at the headquarters building near Gatlinburg, Tennessee.

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ANTIOCH COLLEGE, YELLOW SPRINGS, OHIO

First Meeting of the Herpetologists League

The first meeting of the Herpetologists League will be at San Diego, California, under the auspices of the Pacific Division of the American Association for the Advancement of Science, June 16-21, 1947.

We will meet with the Western Section of the American Society of Ichthyologists and Herpetologists.

Mr. Charles M. Bogert, President of the H. L., plans to be present.

Any Member who will be present or who desires to have a paper read will please communicate with the Secretary without delay.

Only NINE scientific organizations are SPONSORS for this meeting. The Herpetologists League is the only international organization which is acting as a SPONSOR.

The AAAS took action Dec. 29, 1946, to establish an Inter-Society Committee on Science Foundation Legislation, to meet in Washington, D. C. The first meeting will be held Feb. 23, 1947. The June issue of Herpetologica will report progress.

Mr. James A. Fowler of the George Washington University and Dr. W. Gardner Lynn of the Catholic University of America, have kindly consented to represent the Herpetologists League as delegates.

Navel Closure Time and Age in the Young of *Thamnophis radix*

By ALBERT G. SMITH

Among the problems still unsolved by herpetologists, is that of a method to determine the age of snakes. A possible aid to the solution of this question is the consideration of the closure time of the navel in young snakes and the period of time during which the resultant scar tissue persists. A series of 400 young *Thamnophis radix,* mostly specimens from Illinois and Iowa, have been examined with particular attention given to the size of the navel, and the time necessary for the navel opening to close. Certain interesting deductions may be gathered from the data acquired. In the series used, only those preserved young snakes for which both the date of birth and the date of preservation were known, were admitted; the living young were under observation, and, with few exceptions, were permitted to live for varying lengths of time, so that the closing of the navel could be checked periodically.

The position of the umbilicus in the young *radix* is evidently not determined by the position of the developing embryo within the mother. This is, of course, to be expected in ovoviviparous snakes. When the young are born and leave the protective sac, the umbilicus is severed close to the body of the newly-born snake. At this time, the opening in the ventral scales, through which the umbilicus passes, normally extends through three scutes. Although this opening is usually found near the 140th ventral in both sexes, it may occur from the 124th to the 150th ventral in females, and from the 133rd to the 156th ventral in males.

The navel scar has been reduced by about one-third of its area within 48 hours after birth, and only a small tip of the umbilicus is evident. The closing advances toward the center, in which a scar is now present, retaining during the closing process, its elliptical shape. The average time for the closure of the navel opening to become complete is about 96 hours. The closed navel persists as scar tissue, devoid of pigmentation, which may be distinguished in older specimens as a thin light line in the ventral midline between the 124th and 156th ventral. Thus far it has not been possible to exactly determine how long this scar tissue line is evident. No such light line could be seen in 55 of 90 adults checked, which, because of their size, were presumed to be fairly old snakes.

The accuracy within which the date of birth can be determined on field-collected young snakes through the use of this method is probably correct as to date, the standard error of prediction being ± 7 hours. In the series studied, complete closure was effected in from 72 hours (10%) to 110 hours (18%). As this shows a considerable variation in time, because the closure undoubtedly depends on numerous factors, there may well be considerable variation among populations. I had previously

commented on the umbilical scar in *Agkistrodon m. mokasen* in Pennsylvania (1940, Ann. Carn. Mus., 28, art. 5: 79-80), using its presence in a field-collected brood to estimate the date of birth, although, at that time, the possible importance of checking this on other available living broods, did not occur to me. This method presents an extremely interesting problem for further study throughout the range of various species of ovoviviparous snakes.

Recent Herpetological Literature, No. 3

Compiled by ALBERT G. SMITH

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3. Additional Ohio records of *Plethodon richmondi. Ut Supra:* 169.

Wright, Paul A. Sensitization of the frog ovary following hypophysectomy. Physiol. Zool., 19, no. 4: 359-364, 1 fig. Oct. 1946.

Interesting Articles Appearing in "Lacerta"

The Editor, Mr. J. Th. ter Horst, offers to furnish full translations and loan of cuts upon request. Vier-Heemskinderen str. 159, The Hague, Holland.

The October 1946 issue contains:

M. Steiger—*Discoglossus pictus*—rearing of the young.

G. Uiterdyk—Poison fangs and snake poisons—preparation and use of serums.

Notes—Vitamins A and D for captive reptiles—hatching Axolotl eggs —*Lacerta viridis* in a moist habitat—hospital jar for amphibians—hatching reptile eggs.

The November issue contains:

J. Th. ter Horst—Is our native adder dangerous to man?—record of cases shows very low incidence of fatality.

D. P. van Wyk—What do we know about the mental life of reptiles and amphibians?—gregariousness, homing, response to sounds.

Dr. J. P. van der Werff—Report on post-mortem service—sections of various specimens.

The December issue contains:

H. Albers—*Psammodorus algirus*—jumping and climbing ability; hibernation.

J. Bovenkerk—Some experiments with *Rana temporaria*—mortality of females after copulation.

Dr. G. Stoel—Frog meeting place—pool full of mating frogs.

Th. N. Homan—D.D.T. against blood lice—report of experiment.

Pure Science Needs No Champion

Mr. Arthur Loveridge's 469 page "Revision of the African Lizards of the Family Gekkonidae," Bull.M.C.Z., Harvard College, vol. 98, Jan., 1947, is a monumental work which will be reviewed by one of our Members.

On page 4 of the introduction we find: "In this materially-minded and critical age one is not infrequently asked the *raison d'etre* for taxonomic studies, specifically: 'What does it signify if there are 204 or 58 kinds of geckos in Africa? Why should civilized communities be called upon to support and staff museums, national or otherwise, for the purpose of settling these and kindred problems?' "

Does Pure Science need to take the defensive? If so, the progress of civilization will come to a standstill. Does the layman challenge the value of pure science?

Mr. Loveridge thinks so and says in defense of his book: "Geckos, as predators, play a most useful role, not only by destroying countless mosquitoes, sandflies, and termites, but also by attacking such unwelcome creatures as centipedes. It is probable that we are only on the threshold of discovering the importance of geckos to mankind, hence the necessity for a proper understanding of the correct names and ranges of many species."

If this argument is the only *raison d'etre* for Mr. Loveridge's book and for pure science in general, his colleagues, writing about less beneficial (?) creatures are left defenseless.

Fortunately Mr. Loveridge's fear is unfounded. Taxonomic books will continue to appear without the excuse that the subject may be beneficial to man. The taxpayer will not grumble, well knowing that great discoveries arise from unexpected sources.

The defense evoked by Mr. Loveridge and similar statements used by ornithologists to prove man's dependence upon birds are based upon a false conception—that birds or reptiles or amphibians consume an enormous number of injurious insects; that without their help our crops would be consumed.

It is my belief that the insect world would be self-limiting if left to its own devices. Insectivorous animals destroy a larger proportionate share of predacious insects than of harmful, plant destroying species. The predacious species are more easily captured by birds or reptiles than the harmful ones because they are more active and conspicuous since they must hunt for their concealed, plant destroying prey.

If all birds or reptiles were to disappear overnight, some readjustments would ensue, after which the insect world would limit itself as it did before the appearance of amphibians, reptiles or birds upon this planet. Furthermore I believe that the mention of the destruction of a centipede is a very questionable defense until it is known just what the centipede eats. It certainly does not destroy plants but probably eats predacious insects.

In any event, the pages of HERPETOLOGICA remain open to pure science without apologies. ED.

The Status of the *elegans* Subspecies of *Thamnophis*, with Description of a New Subspecies from Washington State

By MURRAY L. JOHNSON

This paper concerns two major points of interest: First, a separation of *Thamnophis elegans* (including the subspecies *T. e. elegans, vagrans, biscutatus,* and *hueyi)* from *Thamnophis ordinoides ordinoides* and *atratus;* and second, the description of *Thamnophis elegans nigrescens,* a Western Washington form allied to *T. e. vagrans.*

In collecting extensively in Washington State, I have long been puzzled by frequently finding *T. o. ordinoides* and individuals previously referred to as *T. o. vagrans* side by side. I have checked carefully the distribution of the garter snakes and have been forced to shift the specific name of the wandering garter snake from *Thamnophis ordinoides vagrans* to *Thamnophis elegans vagrans.* The main criterion in this case is this: Two subspecies of similar ecological niches cannot inhabit the same geographic locality.

Review of literature

Historically we can trace the recognition of an *elegans* population west of the Cascades in the significant literature on the subject. This subspecies is widespread but not common, a fact that has contributed to confusion regarding it. A few specimens collected years ago were usually referred to as *Thamnophis* (or *Eutaenia) vagrans.*

Ruthven (1908) first included *elegans as a subspecies of ordinoides. He did not recognize that there was an elegans population west of the Cascade Mountains.* His distribution maps show *T. o. ordinoides* on the west and *T. o. elegans* on the east of the Cascade watershed, each in its own well defined range.

If he had had our series to work on, his conclusions would have been different judging by the very basis of his genetic concepts. Thus we see that his conclusions were based on misleading data, and have been followed by all succeeding authors: that *T. ordinoides* and *T. elegans* are conspecific.

Van Denburg (1922) believed that the Puget Sound population was closely allied with the Klamath Lake population *(biscutatus),* because of the increased frequency of divided preoculars, and stated (p. 838): "Snakes of the *T. o. vagrans* type occur in portions of the area occupied by *T. o. ordinoides* and often have two preoculars. There seems to be no good reason for calling them *T. o. ordinoides.* It appears much more logical to consider them *T. o. biscutatus*—, although specimens to show the continuity of range from the Klamath Lakes to Puget Sound are not at hand."

Fitch (1940) stated (p. 99): " . . . the differences separating *ordinoides* from other races are much greater than those ordinarily found between subspecies of the same species." He showed in his characteristic, thorough

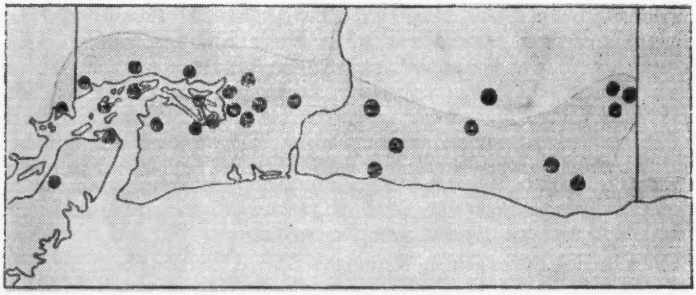

Fig. 1. Shaded area represents the total range of *Thamnophis o. ordinoides*. Dots represent locality records of *T. elegans* subspecies, showing almost complete overlapping of range.

manner, the relationship of the *elegans, ordinoides,* and *hydrophila (couchii)* lines of descent. He likewise recognized that there was a difference of the humid coastal belt *vagrans* population from the wide ranging *vagrans* extending into eastern Washington, but did not feel that the evidence he had justified splitting *vagrans*.

Discussion of the change in nomenclature

I must disagree with the frequent occurrence of more than one subspecies in a given geographical area, as shown by Fitch. However, by his presentation, the relationships are made as clear as is possible without further genetic studies, and his monograph will remain as a firm basis for future studies.

My point is this: Where we have lineal descendants sufficiently differentiated from one another by variation and mutation so that they do not lose their characteristics when intermingling (they breed true and do not cross breed), then we have a bona fide species evolved.

The reasons that so much confusion has arisen with *Thamnophis* are: (1) Sufficient series to show relationships have frequently not been available, and (2) The concept that if intergradation between subspecific races can be shown to exist, evolution of a new species is not taking place.

The foregoing is given because splitting of a species is not to be undertaken lightly in the genus *Thamnophis*.

If we put the range of *T. o. ordinoides* on the map and superimpose the known range of the subspecies of *T. elegans* (Fig. 1) we find the following: *T. e. nigrescens* overlaps without intergradation about two thirds of the Washington state range, and much of the British Columbia area. *T. e. elegans* overlaps without intergradation (Fitch, 1940) about one third of the Oregon range, to the south. In addition to this, we have specimens of *Thamnophis elegans* at the College of Puget Sound

from Washington, Polk, and Tillamook counties, thus nearly completing the Oregon state area of overlap. Our series is not complete enough to determine the subspecific status of these specimens.

In Washington at least, where we have first hand information, the habitat of *T. o. ordinoides* meets and overlaps the habitat of *T. e. nigrescens*. I am not prepared to state whether the "ecological niches" of the two species, in other areas of overlap, correspond.

In addition, separation of the *couchii-hydrophila* group of subspecies into a third species seems to be indicated on the basis of published work.

Regarding the use of the term "hybrid," that might be used to explain the interbreeding that takes place between subspecies of *Thamnophis*, I personally do not believe it is indicated unless in the broader sense. The races of *Thamnophis* are certainly closely related by all available characters. Intergrading races at the present time level must be accepted as merely evidences of relationship where sufficiently differentiated populations have evolved.

Description of T. e. nigrescens

Working with Professor James R. Slater at the College of Puget Sound, I have reviewed available material and have been forced to change my previously held opinion that there was no difference in the *elegans* populations of the eastern and western portions of the state. Though closely related to the wide ranging *Thamnophis elegans vagrans* which occurs in typical form in the eastern part of the state, the population of Western Washington is subspecifically distinct.

Thamnophis elegans nigrescens, new subspecies (Dusky Garter Snake)
Eutainia vagrans, Lord 1866
Eutaenia elegans vagrans, Cope 1892
Eutaenia elegans vagrans, Brown 1903
Thamnophis ordinoides ordinoides, Ruthven 1908
Thamnophis vagrans biscutata, Van Denburg 1897
Thamnophis ordinoides biscutatus, Van Denburg and Slevin 1918, Van Denburg 1922
Thamnophis ordinoides vagrans, Brown and Slater 1939, Fitch 1940, Johnson 1942.

Type—Adult female—College of Puget Sound No. 4471, collected in Tacoma, Washington, by M. L. Johnson, July 15, 1946. Six paratypes.

Description of Type

Total length, 720 mm.; tail, 168 mm.; head distinct from neck; gastrosteges, 164; urosteges 73; dorsal scales 21, the fifth row being added at the level of the twenty-seventh gastrostege; supralabials, 7-7, with third and fourth under eye (the usual for this subspecies if 8-8, fourth and fifth under eye); infralabials 10-10; preoculars, single; posterior genials only slightly larger than the anterior.

The color of this specimen is almost completely dull black except for the submental region where the scales are whitish, suffused by gray and

black where the gastrosteges begin. There is a faint indication of the dorsal line, plainest for the first four or five centimeters behind the parietals; invasion of the dorsal line by the dorsal spots is evident. Very faint evidence of the lateral line can be seen on the second and third row of scales. The two rows of dorso-lateral spots can be distinguished with difficulty on stretching the skin.

This individual represents the extreme of the tendency toward melanism that characterizes this subspecies. It was studied in capitivity through one moult that did not change the coloration. It gave birth to nine young (C.P.S. #4472 a-i).

Diagnosis

This subspecies closely resembles *Thamnophis elegans vagrans,* differing mainly in being darker in general coloration and in having a lower number of gastrosteges and urosteges. It attains a medium size. The head is distinct from the neck. Dorsal scales number 21. Supralabials, 8 (occasionally 7 or 9); infralabials, 10; preoculars frequently divided; gastrosteges vary from 155 to 173; urosteges from 60 to 95.

This subspecies is almost invariably found near water, preferring gravelly streams.

Paratypes

Six paratypes are available from the type locality, each with the following characters of scalation:

C.P.S. No.	Sex	Gastrosteges	Urosteges	Supralabials	Infralabials	Preoculars
3027	♀	157	71	8—8	10—10	1—2
3035	♀	164	72	8—8	10—10	2—1
3038	♂	164	80	7—8	10—10	1—1
3039	♀	157	76	9—9	10—10	1—1
3113	♂	169	86	8—8	10—10	1—1
4450	♀	166	66	8—8	10—10	2—2

Variations

The dorsal scale rows generally number 21. All available specimens show this number except in the San Juan Islands, where an occasional individual has a maximum of 23.

The gastrosteges vary from 157 to 173 in twenty-six males, averaging 165.4; in thirty-one females the gastrosteges vary from 155 to 171, averaging 161.9. Urosteges: males 69 to 95, averaging 76.2 in twenty-six specimens; females, 60 to 86, averaging 71.8 in twenty-eight specimens.

Supralabials, 8; occasionally reduced to 7, rarely 9; infralabials, generally 10. Preoculars are divided on one or both sides in about half of the specimens.

The color varies from solid black in many specimens to a gray-brown ground color between well-defined dorso-lateral spots. The dorsal line is straw-colored and is always invaded by the dorsal spots, sometimes totally. A frequent color variation is a definite steel-blue ground color, including the gastrosteges. The dorso-lateral spots vary from black to dark brown. The gastrosteges are freely, sometimes totally marked with black.

Close relation with *Thamnophis elegans vagrans* is shown by the occasional occurrence of a specimen which is perfectly typical of that subspecies in both scale counts and color pattern. This occurs more frequently south of Puget Sound and suggests intergradation, which, however, cannot be established at this time.

Range

T. e. nigrescens has been secured from all the counties adjoining Puget Sound except Jefferson. Specimens from Vancouver Island, British Columbia are *T. e. nigrescens*. (Courtesy Provincial Museum, Victoria, B.C.) Specimens to the south, Thurston and Lewis counties, approach typical *T. e. vagrans* in pattern and scale counts. No individuals of the *T. e. nigrescens* have been found along the extreme ocean coast or along the Columbia River.

Comparisons

Thamnophis sirtalis subspecies are easily distinguished by the constant 19 dorsal scale rows, 7 supralabials and a different pattern, consisting usually of yellow or greenish dorsal and lateral lines, not invaded by dorsal spots, and lateral bars of a red or greenish tint on a black ground color.

Thamnophis ordinoides ordinoides is shown to be specifically different in the following table:

	T. o. ordinoides	*T. e. nigrescens*
Size	Small; individuals over 360 mm. uncommon.	Medium; individuals over 360 mm. common.
Head	Small; little evidence of neck.	Larger; definite neck constriction.
Dorsal scales	17, (occasionally 19 as a maximum).	21 (occasionally 23 in San Juan Islands).
Supralabials	7	8
Infralabials	8 or 9	10
Gastrosteges	Under 150	Over 155
Habits	Gregarious and common, found either near or away from water. Feeds almost entirely on worms, slugs, and snails.	Not common. Almost always found near running water. Feeds on frogs, fish, as well as snails and slugs.
Pattern variation	Many, with frequent bright yellows and reds incorporated.	Few except in extent of melanism.

Thamnophis elegans vagrans is very close to *T. e. nigrescens* in the general color pattern, but is much lighter, with smaller spots, less gastrostegal black and dark head markings. The dorsal line is clearly defined, though invaded by the dorso-lateral spots; the lateral line is easily made out.

Significant differences are likewise present in scale counts. Gastrosteges of *T. e. vagrans* average 169 and 171 for females and males respectively, as compared to 162 and 165 for *T. e. nigrescens*. The urostege count averages 77 and 83 for females and males of *T. e. vagrans*, 72 and 76 for *T. e. nigrescens*. Preoculars are more commonly divided in *T. e. nigrescens*.

Additional comparisons were made with series from the type localities of *T. e. elegans* (Baird and Girard), *T. e. biscutatus* (Cope), *T. e. vagrans* (Baird and Girard), *T. couchii hydrophila* (Fitch), and *T. c. couchii* (Kennicott). No significant similarities to *T. e. nigrescens* were noted. A number of the above specimens were kindly loaned by the Museum of Vertebrate Zoology University of California, U. S. National Museum, and Chicago Museum of Natural History.

Hereditary factors of T. e. nigrescens

The possibility of variations within broods was investigated: No. 4451 C.P.S. Aug. 18, 1946, DOR Mason County, Washington. This individual contained nine young, all of which show 21 dorsal scale rows, 8 supralabials, and 10 infralabials, and typical *vagrans-nigrescens* type of spotting, except one without spots. No. 3055 C.P.S. Aug. 25, 1937, Shaw Island, Washington, contained nineteen young. All show 21 dorsal scale rows, 8 supralabials, and 10 infralabials. Of this brood, eight are typically spotted; eleven are unspotted. (This last I cannot explain, as we have yet to secure an adult with this pattern. It may represent an incipient or undiscovered color phase. It has no relation to *T. o. ordinoides* which is likewise spotted.) No. 4471 Sept. 6, 1946 Tacoma, Washington, produced nine young. All showed 21 rows of dorsal scales, 8 supralabials (except one had 7 on one side), and 10 infralabials. Gastrostege counts of this series are all over 155; and all have typical spotting. No. 4506 Oct. 1, 1946, Mason County, Washington, produced five young. All showed 21 rows of dorsal scales, 8 supralabials, and 10 infralabials; gastrostege counts over 155. All show typical spotting.

These are all from areas where *T. o. ordinoides* is likely to be found side by side with *T. e. nigrescens*. As can be seen, no single individual showed any tendency toward *T. o. ordinoides*. Conversely, many broods of *T. o. ordinoides* were examined and no evidence of color pattern or scale counts of *T. e. nigrescens* was found.

In other words, we have two species on the basis of multiple differential characteristics. We do not find evidence of blending of these characters in our many adult specimens. We have at least presumptive evidence that the transmission of these characters does not occur as an occasional character in broods of either species. They breed true according to the evidence shown by well differentiated adults.

It is worthwhile inserting a note here regarding the appearance of the young of *T. e. nigrescens, T. e. vagrans,* and *T. o. ordinoides,* either newly born or in later embryo life. The characters exhibited at this stage of life represent basic color patterns that later in life become obscured by either: (1) Extension of the melanistic elements of the color pattern, or (2) Development of latent color potentialities through influences of environment.

In *T. e. nigrescens* this pattern is a gray to gray-brown base color, a straw-colored dorsal line, a light gray to straw-colored ill-defined pair of lateral lines, and well-defined temporal bars. Gastrosteges are freely marked with black over the grey ground color. There are two alternate

rows of black spots between the dorsal and lateral lines, of which the dorsal row invades the dorsal line and is much more prominent than the lateral row. (The converse is true in *T. o. ordinoides*.)

T. o. ordinoides is our commonest snake; color and pattern variations are almost without number, but evidence at hand indicates that these variations are produced later in life upon a standard color pattern that is present at birth. This evidence is based on broods of Washington specimens alone. This basic pattern is not infrequently seen in adults; ground color is brown; a light yellow dorsal line may be absent or present in part; lateral stripes are indefinite. Just above the lateral stripe there is a series of dark spots, alternating with a more dorsal series of spots. This more dorsal series is minimal and may be absent. Ventrally the color is light yellow to olive, becoming darker posteriorly.

I believe that study of the development of color pattern throughout embryological life is most important in tracing relationships where this color pattern is an integral part of the differential diagnosis of species or subspecies. Certainly further study along this line is indicated.

A final note is in order, regarding the statements made by Ernst Mayr concerning the specific rank of *ordinoides, elegans,* and *couchii* (1942: 133). He suggests the same conclusion on the basis of his wide background in the study of systematics as is brought forth in this paper, based on extensive first-hand material.

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*Fellows. Correction. The asterisk was unintentionally omitted from the name of Dr. Olive S. Davis in the last issue.

Murray's *Reptiles of Sind*, with a Note on Three Forgotten Descriptions of Indian Sea-Snakes, Published Therein

By GEORGE S. MYERS

In 1884 James A. Murray published his well-known *Vertebrate Zoology of Sind*. Two years later, in 1886, he published a much less well-known treatise, as follows:

The reptiles of Sind;/ a systematic account,/ with descriptions of all the species/ inhabiting the province, and a table of their/ geographical distribution in Persia,/ Beloochistan, Afghanistan, Punjab, North-/ west Provinces, and the peninsula of/ India generally,/ with/ woodcuts, lithographs, and coloured illustrations./ By/ James A. Murray,/ Curator, Kurrachee Municipal Museum; author of a "Hand-book/ to the geology, botany, and zoology of Sind;" "The plants/ and drugs of Sind;" "Kurrachee to Kandahar;" "The/ vertebrate zoology of Sind," &c./London:—Richardson & Co., 13 Pall Mall./ Bombay:—Education Society's Press, Byculla./ 1886.

On reverse of title page: Bombay:/ Printed at the Education Society's Press, Byculla.

Pages vi + 92 + 3 [of index]; 8 text-figures [unnumbered]; 7 lithographed plates [unnumbered; the first, of *Echis carinata*, being the frontispiece, and only one, of *Hydrophis bishopi*, facing p. 59, being colored, in the copy at hand].

I have seen only one copy of this work; it was formerly in the Howard A. Kelly library and is now in my own. The text and plates seem to be in the greater part a reprint of the reptile section of Murray's *Vertebrate Zoology of Sind*. and are stated to be such in the preface, but there is also an important addition. Pages 72 to 92, inclusive, are devoted to a series of addenda. Of these, pages 90 to 92 are taken up with an extensive distributional table of the species, while pages 71 to 89 give notes on the following species: *Melanochelys pictus*, 71; *M. trijuga*, 72; *Ophiops jerdoni*, 74; *Euprepes Guentheri*, 74; *Riopa Hardwickii*, 74; *Hemidactylus Kushmorensis*, 75; *H. persicus*, 76; *Teratolepis* (*Homonota*) *fasciata*, 77; *Agamura cruralis*, 78; *Gymnodactylus scaber*, 78; *G. brevipes*, 80; *Sitana ponticeriana*, 81; *Calotes grandisquamis*, 81; *Charasia ornata*,, 82; *Agama isolepis*, 83; *Acontiophis paradoxa*, 84; *Chersydrus granulatus*, 84; *Hydrophis asperrimus*, sp. nov. 85; *H. tesselatus*, sp. nov. 86; *H. aurifasciata*, sp. nov. 87; *H. lapemoides*, 88; and *Rana sternosignata*, 88. The names and orthography given in the above list are Murray's, with the page numbers at which the names occur. The descriptions of the three new sea-snakes are each accompanied by a text-figure of the head scutellation, giving both side and inferior views. The last plate in the work, figuring the heads of five other species of sea-snakes, is included in the addenda, facing page 82.

These important addenda seem entirely to have escaped recent herpetologists working on the Indian fauna. They are not mentioned or quoted by Nicholson, Boulenger, or Malcolm Smith; I have not searched Colonel Wall's papers to see if he knew the work, but I doubt that he did. Of the three new species of sea-snakes, the only reference to any of them I have seen is in Smith's *Monograph of the Sea-snakes* (1926). On page 50, Smith remarks (footnote) of a British Museum example of *H. spiralis*: "The specimen is labelled *Hydrophis aurifasciata,* Murray, but apparently was never described."

Of *H. asperriums,* Murray appears to have had but one specimen, 60 inches long with 368 ventrals; the locality given is "Kurrachee Sea and Persian Gulf" and the species is compared with "*H. tuberculata* and *dayanus.*" I suspect it may be *Hydrophis cyanocinctus.* Of *H. tesselatus,* he had an adult 28 inches long and three young, each of 12 inches. The locality given is the same as that of the preceding. Of *H. aurifasciata,* there seems to have been but one, 41 inches long, with 367 ventrals. The locality is "Kurrachee Sea," and it is possible that Murray's specimen was *H. spiralis,* although none of Malcolm Smith's examples could have been the type.

It is to be hoped that these nominal species may be correctly assigned by someone with abundant material at his command. The Stanford Museum's sea-snakes are all from farther eastward.

NATURAL HISTORY MUSEUM,
STANFORD UNIVERSITY, CALIF.

Desiderata—Mr. Richard A. Spieler, 273 Winchester St., Rochester 13, N. Y., requests field notes on or specimens of *Anolis.*

Notice—The Editor will not receive any live specimens sent C.O.D. or otherwise. Several European shipments have arrived. Our foreign correspondents are notified that the number of vivarium keepers among the Herpteologists League is negligible.

Thanks to Mr. Richard Westwood, Editor of Nature Magazine, for the fine "plug" he gave us Jan., 1947, p. 5, on the thigmotactic Sphaerodactyl.

Desiderata—Mr. Clarence H. Shockley, 924 Woodlawn Ave., Terre Haute, Indiana, is working on a new paper on the herpetology of that State. He would appreciate any material, with data, especially from the southern part of Indiana.

To Mr. Earl C. Martin, Herpetologica is deeply indebted for his free contribution of zinc cuts. This issue contains two, but the next issue promises to contain many more. Many thanks, Mr. Martin.

The Speckled Rattlesnake in NW Arizona

By ANGUS M. WOODBURY *and* ROSS HARDY

A specimen of the Southwestern Speckled Rattlesnake, *Crotalus mitchellii pyrrhus,* now in the Weber College collection was taken in northern Mohave County, Arizona, from a jumble of rocks and broken ledges at the Virgin Narrows northeast of Littlefield, about six miles south of the Utah State Line on May 2, 1944. The snake is a female 640 mm. in snout-vent length, 76 mm. tail length (without rattles), and the six rattles are 24 mm. long. There are 23 scale rows, 179 ventrals, the anal, 21 caudals, and two additional caudals which have been subdivided. The animal is very light gray-brown and cream in color appearing much like the snake in the photograph shown by Klauber (Trans. San Diego Soc. Nat. Hist. 8 (19): pl. 20, fig. 1). There are 36 body blotches and 5 tail rings, the three distal rings being black and the two proximal light brown. The three black tail rings are connected on the dorsal surface by a black band to form a zig-zag pattern. All rings are incomplete on the ventral surface. The proximal rattle is black. The lateral body blotches connect with the dorsal series on the anterior part of the body as well as on the posterior part. There is no dark postocular line as in *pyrrhus.*

The rostral is dished and measures 4x4 mm. There are 15 left supralabials and 16 on the right side; 16 left infralabials and 17 right. The upper preocular is divided vertically and the first infralabials divided transversely. The prenasals are in contact with the rostral only for part of the distance being separated over halfway by small scales at the dorsolateral edge of the rostral. There are no sutures, pits or indentations in the supraoculars nor are there scattered black-tipped scales on the body as in *stephensi.*

This snake is obviously an intergrade between *Crotalus mitchellii pyrrhus* and *C. m. stephensi* and is here referred to *pyrrhus.* This extends the line of intergradation between these two forms nearly a hundred miles to the northeast.

UNIVERSITY OF UTAH and WEBER COLLEGE

Introduction of the Bullfrog into Washington County, Utah

By ROSS HARDY

The common bullfrog *(Rana catesbeiana)* was introduced into Washington County, Utah, by the late Charles Alsop, who placed animals in a pond on Mount Hope in the northern part of Saint George. The original stock, according to Mr. A. A. Paxman, Biology instructor of the Woodward High School, Saint George, came from near Lexington, Kentucky, in the summer of 1934. By the spring of 1938, these frogs were known to many people and had spread to Watercress Springs, Dodge Pond, and were occasionally found in irrigation ditches of Saint George. In May, 1943, a few were heard at a small marsh at the junction of Santa Clara Creek and Virgin River, nearly three miles south of Saint George.

An adult was kept alive from September, 1942, until June, 1946, at Dixie Junior College. Its adaptation to a desert diet is illustrated by the alacrity with which this animal has taken as many as six rodents at one time, swallowing living adult *Peromyscus, Perognathus,* and the smaller varieties of *Dipodomys.* One of these large frogs was found foraging in the brush about 100 feet from water at Watercress Springs.

Goldfish and the snails, *Lymnaea glabra* (Muller) and *Vivipara malleata* (Reeve), the latter reported by Jones (1940, Proc. Utah Acad. Sci., Arts & Lett. 27:33-45), were introduced at the same time as these frogs. School children are known to have carried goldfish and bullfrog tadpoles to the neighboring towns of Santa Clara and Washington for transplantation. Goldfish are abundant in Middleton Creek between Saint George and Washington.

WEBER COLLEGE, OGDEN, UTAH

The Scorpion as a Lizard Enemy

By ROSS HARDY

Perhaps large scorpions commonly found at the end of short tunnels beneath rocks in the desert of southwestern Utah may be enemies of lizards.

On May 13, 1939, two *Uta stansburiana stejnegeri* and two *Sceloporus g. graciosus* lizards were placed in a two gallon stone jar. In the bottom there was a thick layer of sand and a scorpion (*Hadrurus hirsutus* Wood). Within a short time, one of the lizards was dead, obviously having been killed by the scorpion. The next morning one living Uta was removed from its hiding place in the sand. The other three lizards were dead. The scorpion had eaten all of one *Sceloporus* except the tail and one hind leg. During the third day (May 15) the scorpion abandoned the *Sceloporus* tail and leg and began eating the *Uta* lizard. It began eating at the lizard's nose and ate all day, bit by bit, until at nightfall it had eaten the anterior one-half. The scorpion held the lizard close with its chelicera, and with the mouthparts moving rapidly, pulled a thin, continuous stream of material into its mouth, reminding one of unraveling a sweater or similar knitted article. The bones seemed to dissolve into the slimy mass and evidently were eaten with the rest of the material.

At two other times during 1945, this experiment was repeated with other scorpions of the same species. In each case the results were the same except that the method of feeding was not observed, since the *Uta* lizards after being unmolested in the cage with the scorpions for a number of days, were killed and partially eaten during the night.

Hadrurus hirsutus is commonly found in a small chamber beneath rocks in southwestern Utah and southern Nevada. Possibly these scorpions would be able to catch lizards entering the small tunnel leading to their place of concealment.

WEBER COLLEGE, OGDEN UTAH

Transmetamorphic Memory in *Ambystoma texanum*

By MRS. ROBERT BRANDT

On April 9, 1946, I received 4 larvae of *Ambystoma texanum* which I hoped to keep for some time in their "axolotl" stage, since they were only 1¼ to 1½ inches long. I was unable to procure enough live miniature crustaceans to satisfy their voracious appetites, so I trained them to take tiny threads of beef from an eyebrow tweezer. They learned very fast to recognize the shiny tweezer, and gathered around to get their share.

On April 23, 1946, at 8:30 A.M. the largest larva did not show any interest in the food, the gills had disappeared, and its back crest seemed flattened. At 10:45 A.M. the eyelids began to show and by 12 noon the transformation of the head into a salamander head was completed. By that time the legs had grown much stronger, though the back crest was still visible. At 3 P.M., still showing a flattened back crest, the creature for the first time left the water for a few minutes and began to breath by its lungs. At 11 P.M. the transformation into a salamander was completed, although it still spent most of its time under water. It was not until 11 o'clock the next morning that the tiny salamander left the water to rest on a hyacinth leaf that formed a small cradle.

For six days the *Ambystoma texanum* did not show any interest in its surroundings. On the evening of the seventh day it showed sudden interest in the eyebrow tweezer. It associated it with food, and came nearer, waiting to be fed. It took the small pieces of meat I offered, and fed regularly from that moment.

Between May 5 and 10, the transformation of the other three larvae took place, the procedure being almost identical to the first one. And all of them remembered the shiny feeding object between 6 and 8 days after completed metamorphosis. Two salamanders died 3 weeks later without any apparent reason.

I transferred the 2 surviving salamanders to a terrarium on June 10, 1946. The very moment they were put on soil both started to dig with their heads and front feet, and disappeared in a few minutes. They stayed underground until October 22, 1946. They had grown when they emerged, their skin was glossy, and they seemed to be in a well nourished condition, though I had been unable to feed them for more than 4 months. In the meantime I had put a few other salamanders in the same terrarium which were fed on bugs and mealworms, but the *Ambystoma texanum* did not show any interest in the live food. Again the eyebrow tweezer went into action, and after a pause of 4 months and 12 days both salamanders associated the metal gadget with food, and have been feeding this way ever since.

CINCINNATI, OHIO.

Mite Control in Reptile Collections

By ROBERT H. MATTLIN

Mites are a never-ending source of annoyance to the individual or institution engaged in maintaining a collection of living snakes. Several methods are employed for the control or eradication of these pests. The most universal is soaking infested specimens in water for several hours while the cage is thoroughly scrubbed with strong soap and water or some disinfectant. While this procedure is effective, the time consumed does not permit its general use where large collections are maintained.

In the Cleveland Zoological Park the reptile exhibit is a more or less temporary set-up awaiting the construction of a reptile house. Specimens are housed in glass fronted, wooden cages placed behind orifices cut in decorated plywood panelling. Since cages of this type are prone to develop slight cracks where the boards are joined, mites are afforded numerous, almost inaccessible hiding places. Our mite problem was a serious one until the following procedure was inaugurated.

When mites appear in a cage, the specimens are removed and placed in a bag, the inside of which has been sprinkled with a flea powder, manufactured by the Jensen-Salsbery Laboratories, Incorporated, of Kansas City, Missouri. The formula number of the product is RX 1621. Mites clinging to the specimen drop off almost immediately but the snake is allowed to remain in the bag until the cage is "demited" in the following manner:

The floor covering of the cage (in this case pea gravel) is removed and the cage liberally dusted with the powder, making sure all cracks and corners are carefully covered. A thin coating of the powder is then sprinkled over the cage floor and fresh gravel placed over it.

The snakes may be returned to the cage immediately with a loss of only ten to fifteen minutes exhibition time as against several hours if the snakes are soaked. It might be added that in no instance has the application of the powder to a cage or a specimen affected the snake's appetite in any way. Many times, cages and specimens have been treated in the afternoon and the snakes fed the same evening.

As a preventive, each of our cages is dusted lightly every two weeks, using the powder in a dusting gun. Only the water container is removed during dusting. The snakes are allowed to remain in the cages.

Since March, 1946, when we first used the powder, mites have been a rarity in the reptile collection of the Cleveland Zoological Park.

Changes of Address

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The Allocation of *Testudo rugosa* Shaw

By M. B. MITTLEMAN

In their recent study of the Antillean pseudemyds, Barbour and Carr (1940) have contributed materially to our understanding of this notoriously confused genus. However, it seems to me that these authors may have overlooked some of the possibilities for properly allocating a name which has been so often used, and so generally misapplied, as Shaw's *Testudo rugosa* (1802: 28, pl. 4). Thus, while Barbour and Carr consider *rugosa* unidentifiable, and for the sake of convenience best disposed of as a synonym of the Jamaican *P. terrapen,* I believe that the data available from Shaw's original description as well as that collected by Barbour and Carr for various West Indian *Pseudemys,* will permit identification with considerable certainty and indicate an origin other than Jamaica.

The name *rugosa,* as shown by Barbour and Carr (*op. cit.*), has been used by various authors for a number of species, invariably to designate old and melanistic males. A year prior to the publication of Barbour and Carr's work, Mertens (1939: 37-40, pl. 6) described the gradual color changes which take place in male *Pseudemys,* on the basis of 19 specimens from Hispaniola (listed by Mertens as *P. palustris palustris,* but apparently *P. stejnegeri vicina* and *P. decorata*). Somewhat later, Mertens (1943: 313-319) described the actual changes of color observed in a single male specimen of *"Pseudemys palustris palustris"* (=*P. stejnegeri vicina*) taken in the lower Rio Jaina, near Ciudad Trujillo, Dominican Republic, and concluded that *"rugosa"* and *"palustris"* were identical. Mertens' conclusions referred actually to a biological problem, rather than a nomenclatural one, since the intent of his work was to show that *"rugosa"* as used previously was predicated merely upon the additive changes in color and form which accompany age in male *Pseudemys.* That Shaw's *rugosa* is based on a melanistic male terrapin seems evident from an examination of his description and plate, and from the photograph of Shaw's type reproduced by Barbour and Carr (pl. 1, figs. 2, 4). However, the wide-spread occurrence of melanism in *Pseudemys* does not preclude the identification of Shaw's species.

The available information regarding Shaw's type, as taken from his description, and from Barbour and Carr's photograph of the type, may be summarized thus:

1. Dorsally the carapace is oblong with the sides (from the fourth to about the eighth marginal) straight but not parallel; a slight lateral flaring of the carapace at about the level of the eighth or ninth marginal.
2. The dorsal pattern is described by Shaw (*loc. cit.*) as "black . . . mottled and variegated with yellow." Barbour and Carr's photograph reveals little of the pattern described and figured by Shaw, due perhaps to the lighting used in taking the photograph or else to a general darkening acquired over the course of almost 150 years.

The underside of the carapace (Barbour and Carr, pl. 1, fig. 4) is characterized by a general anastomosis of the melanins on the anterior marginals, while the posterior marginals are lighter but prominently vermiculated.

3. A worn but prominent vertebral ridge commences with a boss or knob on the posterior part of the first vertebral scute, and extends backward to the middle of the fourth vertebral, where it ends abruptly (visible in Barbour and Carr, 1940: pl. 1, fig. 2, but not in Shaw, 1802: pl. 4).

4. Shaw (*loc. cit.*) describes his type as being nine and a half inches long, and three inches high in its greatest vertical dimension. Using Barbour and Carr's method, this results in a length/height ratio of 3.16.

Commencing with the quantitative data available, the proportions of the *rugosa* type may be compared with the following protocol, which lists the length/height variations of the several known forms of Antillean pseudemyds, as taken from various publications.

species or subspecies	length/height variation	distribution
terrapen[1]	2.56 - 2.66, av. 2.61 (♂)	Jamaica
	2.42 - 2.62, av. 2.51 (♀)	
vicina[1]	2.58 - 2.68, av. 2.63 (♂)	Dominican Republic
	2.42 - 2.58, av. 2.46 (♀)	and Haiti
decorata[1]	2.52 - 2.82, av. 2.65 (♂)	Eastern Haiti, Fond
	2.36 - 2.72, av. 2.53 (♀)	Parisien, Thoma-
decussata		zeau, Ile á Vache
(and races)[1]	2.65 - 3.55, av. 2.90 (♂)	Cuba
	2.50 - 3.21, av. 2.70 (♀)	
stejnegeri[1, 4]	2.46 - 2.71, 2 specimens (♂)	Puerto Rico,
	2.49 - 2.70, av. 2.56 (♀)	Vieques Island
felis[2]	2.40 - one specimen (♂)	Tea Bay, Cat. Isl.
	2.41 - 2.69, av. 2.53 (♀)	
maloneï[3]	2.36 av. for ♀♀, no data	Great Inagua Isl.,
	for ♂ ♂	B.W.I.
granti[5]	2.65 - 2.73, 2 specimens (♂)	Cayman Islands
	2.39 - 2.48, 2 specimens (♀)	

Table 1. Length/height variations in West Indian *Pseudemys*. Data from: (1) Barbour and Carr, 1940; (2) Barbour, 1935; (3) Barbour and Carr, 1938; (4) Schmidt, 1928; (5) Barbour and Carr, 1941.

So far as these samples go, the type of "Shaw's *rugosa* with a length/height ratio of 3.16 is most similar to the Cuban forms recognized by Barbour and Carr (1940) as *decussata* and its races. The similarity between Shaw's type and the Cuban *Pseudemys* is further seen when Shaw's, and Barbour and Carr's plates of the type are compared with published illustrations of other *Pseudemys*. Even with due allowance for the extreme variability of *Pseudemys* patterns, the resemblance between

the type and the Cuban pseudemyds is most striking. None of the other known Antillean terrapins shows the intensive melanism and heavy vermiculation so characteristic of the males of the Cuban *Pseudemys*.

Two additional factors tend to identify Shaw's type with the Cuban *Pseudemys*, and to indicate its provenance. As pointed out, the *rugosa* type presents a grossly oblong appearance, with a slight lateral flaring at about the level of the eighth or ninth marginals, and hence well caudad. Barbour and Carr (1940: 397) have reported that there are two general phases of Cuban *Pseudemys*: "either short and oval, with widest point near middle of long axis (western phase), or elongate and oblong, with widest point well behind middle (eastern phase)." On the basis of these generalities, it could be inferred that Shaw's type represents the eastern Cuban population. This inference is strengthened by an examination of Barbour and Carr's data showing a correlation in the carapace length/height ratio and the east-west differentiation in form; a summary of their findings being as follows (all figures are averages):

Rio Jobabo	3.09 (♀)	3.25 (♂)	average all specimens = 3.17
Central Oriente	2.74 (♀)	2.92 (♂)	average all specimens = 2.83
Camaguey	2.60 (♀)	2.99 (♂)	average all specimens = 2.79
Soledad, Cienfuegos	2.50 (♀)	2.76 (♂)	average all specimens = 2.63
Pinar del Rio (Caribbean Slope)	2.60 (♀)	2.73 (♂)	average all specimens = 2.66
Pinar del Rio (Gulf Slope)	2.57 (♀)	2.65 (♂)	average all specimens = 2.61

Table 2. Geographic variation in carapace length/height ratios in Cuban *Pseudemys* (data from Barbour and Carr, 1940: 400).

Finally, in their discussions of Cuban pseudemyds, Barbour and Carr point out that the Rio Jobabo population is distinguished by a very flat carapace (resulting in a high length/height ratio), and a straight vertebral profile which is most prominent from the posterior part of the first vertebral scute to the fourth vertebral. Terrapins from other parts of Cuba have an arched vertebral profile (and consequently a lower length/height ratio). In line with these findings, the low plane of the carapace in Shaw's type (as evidenced by its length/height ratio), and the prominent vertebral ridge commencing on the first, and ending on the fourth, vertebral (see Barbour and Carr, pl. 1, fig. 2), lends further corroboration to the identification of this specimen with the Cuban *Pseudemys*, and more specifically the population of the Rio Jobabo drainage.

Barbour and Carr's allocation of *rugosa* to the synonymy of *terrapen* does not seem warranted. This latter species is characterized by a relatively high carapace (length/height ratio averages 2.51 in males, 2.61 in females; see Table 1), which is "somewhat wedge-shaped from dorsal aspect"; the vertebral ridge extends well onto the fifth vertebral scute

and only gradually arises and declines; and finally, the pattern is usually obsolescent and does not present a bold vermiculation of yellow and black.

As a result of their studies, Barbour and Carr (1940) have concluded that Gray's *Emys decussata* (1831) is referable to the pseudemyd ranging widely over Cuba, exclusive of the drainage systems of the Rio Jobabo and the Caribbean slope of Pinar del Rio Province, for which populations they have suggested the names *P. d. plana* and *P. d. angusta.* The evidence appears to warrant the recognition of three annectent races of *Pseudemys* in Cuba. With the allocation of Shaw's *rugosa* to the population of the Rio Jobabo drainage in eastern Cuba, and the consequent suppression of the name *plana,* the resultant nomenclature of the Cuban pseudemyds must then stand as *Pseudemys rugosa rugosa* (Shaw). *P. rugosa decussata* (Gray), and *P. Rugosa angusta* Barbour and Carr.

Acknowledgments

I am indebted to Mr. Karl P. Schmidt for certain literature references, and to Dr. Robert Mertens who has been kind enough to read this note in manuscript and to offer a number of helpful suggestions.

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Some Insect Food of an Idaho Lizard

By GEORGE F. KNOWLTON

While assisting me as an undergraduate, and later as a graduate student in entomology at the Utah Agricultural Experiment Station, Clyde F. Smith developed an intelligent and active interest in the insectivorous vertebrates of the region in which he lived and worked. He helped me collect numerous birds and lizards from desert breeding areas of the beet leafhopper in various parts of Utah. While visiting his home and friends near Preston, in southern Idaho, Mr. Smith found time to collect 17 *Sceloporus graciosus graciosus* (B.-G.) at Water Hollow (near Riverdale) and 85 specimens of this species at Bear River Narrows, in Idaho, on July 15, 1934.

Examination of the stomach contents revealed 259 insects recognized at least to order in the 17 stomachs from Water Hollow specimens, including 189 ants. In addition 8 spiders were present. 365 insects were recognized among the stomach contents of the 85 *graciosus* from Bear River Narrows, only 62 being ants. In addition two spiders and one tick were present. Evidently insects were more readily available, or the lizards had fed longer before being collected at Water Hollow, because the stomachs generally held a larger number of recently ingested insects.

Total recognizable insect contents in the 102 *S. g. graciosus* stomachs consisted of 17 Orthoptera, of which 10 were grasshoppers; 1 Odonata; 6 Homoptera, of which 2 were aphids and 2 leafhoppers; 23 Hemiptera, 2 being pentatomid stinkbugs, 4 mirid bugs, 2 lygaeids, 1 *Lygaeus kalmii*, and 1 lace bug; 42 Coleoptera including 1 click-beetle, 6 dermestids, 1 ladybird, 5 leafbeetles, 2 weevils and 3 darkling beetles; 9 Lepidoptera, mostly caterpillars; 7 Diptera; 260 Hymenoptera, 251 being ants. The ten spiders, 1 tick, large numbers of insect fragments, 1 plant fragment and a few grains of sand that probably were taken by accident while feeding, made up the balance of recognizable contents.

SUPPLEMENT. *Aphids Eaten by Lizards*: Occasionally I have found aphids within the stomachs of small lizards, collected in various parts of Utah. Four pea aphids were present among food in the stomach of a *Uta stansburiana stansburiana* (B.-G.) collected on the margin of an alfalfa field at Elgin, Utah, May 8, 1941. A pea aphid also was found in one of 56 stomachs of *Sceloporus graciosus graciosus* (B.-G.) collected in the Vernon Creek area of Tooele County, Utah. Several stomachs of lizard specimens taken among sagebrush have contained *Macrosiphum, Aphis* or other aphids with sharp-pointed beaks so common on *Artemisia* in Utah and southern Idaho.

UTAH STATE AGRICULTURAL COLLEGE, LOGAN, UTAH

Ophiophagous Young Black Snakes

By ROBERT G. HUDSON

Summarizations of the feeding habits of *Elaphe obsoleta obsoleta* (Say) usually include birds, small mammals, and frogs, but snakes are rarely mentioned. It may be of interest, therefore, to record an instance in which a hatchling *obsoleta* constricted and swallowed a baby *Heterodon contortrix contortrix* (Linnè).

Eight *obsoleta* were hatched in the Philadelphia Zoological Garden on October 7, 1946, but, owing to a temporary shortage of cages in the reptile house, a small *contortrix* was placed with them one afternoon a few days later. One of the black snakes seized the hog-nosed snake behind the head and within two minutes had thrown two coils around its victim. Little pressure seemed to be exerted, however. Other than opening and closing its mouth the *Heterodon* offered little resistance, and it remained alive during the entire swallowing process. Engulfment was complete in seventeen minutes.

The brood of young black snakes has since been feeding well and regularly on baby mice and small strips of raw meat, liver, and fish.

PHILADELPHIA ZOOLOGICAL GARDEN

Supposed Cases of Mimicry in Salamanders

By SHERMAN C. BISHOP

In 1927, Dunn (Copeia, No. 164, pp. 84-86) described as a new mountain race, *Desmognathus fuscus imitator,* taken in the Great Smoky mountains of North Carolina. This salamander was characterized by the possession of a bright red patch on each side of the head behind the eyes. The interesting point in connection with this development is the fact that the red-cheeked Desmognathus was taken in the area in which is found the red-cheeked *Plethodon jordani.* Subsequent study of the Desmognathus by Pope (Amer. Mus. Novitates No. 306, pp. 11-14, 1928) led him to the view that it is to be regarded merely as a local color variety of *Desmognathus fuscus carolinensis,* which the writer regards as a subspecies of *D. ochrophaeus.*

In January, 1946, I received from Mr. J. C. Nicholls, Jr., a series of specimens which have all the external characteristics of *carolinensis* except that they have bright red blotches developed to a greater or less extent on the legs. These specimens came from Tusquitee Bald, about 7¼ miles southeast of Andrews, N. C., and this area is within the range of the only other red-legged salamander known, *Plethodon glutinosus shermani.*

Dunn (ibid) regarded his specimens as exhibiting "a clear case of mimicry," and remarked further that coincidence scarcely avails to explain the resemblance in color of the one form to the other. The discovery of another population of the same subspecies of Desmognathus, which has taken on the color characteristics of a second member of the genus Plethodon, would seem to strengthen Dunn's contention.

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Herpetological Papers in Some Texan Journals

By HOBART M. SMITH

In the following list the papers indicated by an asterisk have been cited in the Zoological Record.

I. Technical Bulletin of Stephen F. Austin
State Teachers College at Nacogdoches, Texas.

This journal was begun in February, 1939; the last issue appeared in May, 1941. The following have been published: vol. 1, nos. 1-10; vol. 2, nos. 1-3; and vol. 3, nos. 1-3. All are short separate publications of a few pages. Only one on herpetology has appeared:
Parks, Hal B., Frank Archibald and Marl Caldwell.

1939. Amphibians and reptiles of east Texas pine belt. Vol. 1, no. 6; 1-4 (pp. unnumbered). Fifty-eight species in a simple list of only scientific and common names. No specific localities indicated. At least in part based upon actual specimens, mostly identified by Dr. A. H. Wright. Among the unusual records are: *Triturus meridionalis, Bufo lentiginosus americanus, Kinosternon flavescens, Gopherus polyphemus, Terrapene ornata, Sceloporus floridanus* [=*S. olivaceus*], *Leptotyphlops dulcis, Carphophis amoena vermis, Drymarchon corais couperi, Elaphe laeta, Heterodon nasicus, Pituophis sayi sayi, Natrix grahamiae, N. taxispilota, Thamnophis marciana, Tantailla gracilis.*

II. Transactions, Proceedings and Special Publications of the Texas Academy of Science.

The Transactions and Proceedings were published together, in single issues per volume, from vol. 1 (1892) through vol. 17, in vol. 19, and from vols. 25 to date (vol. 28). The Transactions for vol. 22 were never published. The Academy was disbanded in 1913 (at vol. 12), and was reorganized in 1928 although publication was not resumed until the 1929 meeting. At that time it was decided to omit vol. 13 for the time being and reserve it for a historical account of the Academy. It has not been published up to this time.

There is no series entitled "Special Publications." The paper included in it here was, however, financed by the Academy, and is therefore regarded as a "Special Publication." It was sponsored by a number of associations, but chiefly the Academy was responsible. Unfortunately no indication whatever is given on the pamphlet of its publisher or the series in which it might have been published. The Librarian of the Academy, Dr. S. W. Bilsing, agrees that it may most appropriately be termed a "Special Publication."
Brooks, Barney

*1906. The anatomy of the internal urogenital organs of certain North American lizards. Trans. 8: 23-38, pls. 1-4. The anatomy of the following species is reported: *Sceloporus floridanus,*

Holbrookia texana, Phrynosoma cornutum, Phrynosoma sp., *Crotaphytus collaris, C. wislizenii, Eumeces guttulatus, Gerrhonotus infernalis, Cnemidophorus gularis.*

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1943. Interrelation of the cortical and medullary tissue in the adrenal of Phrynosoma cornutum. Trans. 26: 43. Adrenals intermediate between those of amphibians and mammals: interrenal and suprarenal tissues intertwined throughout. Like amphibians the suprarenal tissue is concentrated in the cortex, the reverse of the mammalian condition.

Jones, A. W., B. W. Mounts and G. B. Wolcott

1945. A pronocephalid trematode from the *a*-Pseudemys. Trans. 28: 92-93. Duodenal flukes of the genus *Macrovestibulum* from *"Pseudemys Troostii"* and *"P. Texana."*

Mitchell, J. D.

1903. The poisonous snakes of Texas, with notes on their habits. Trans. 5: 19-48, pls. 1-11. Common names, description (quoted from Stejneger), distribution in Texas, habits (personal observations in Texas), for each of 12 species.

Murray, Leo T.

1937. System of indices for the dermal skeleton of the Testudinata. Proc. 20: 16. Five indices for standardization of descriptions of turtles proposed and briefly described: horizontal somatic, vertical somatic, girdle, bridge and plastral.

1938. Basic research problems in out-door herpetology in Texas. Proc. 22: 18-19. A brief statement of certain problems connected with the following: *Siren, Triturus, Typhlomolge rathbuni, Eurycea neotenes, Sceloporus, Sonora semiannulata, Virginia, Potamophis, Graptemys geographica versa, Terrapene triunguis, Gopherus berlandieri, Malaclemmys, Chelydra osceola, Amyda.*

Parks, H. B., V. L. Cory, *et al.*

1936. Biological survey of the east Texas big thicket area. The fauna and flora of the big ticket area. Spec. Publ.: 1-51, ill. Reptiles and amphibians, pp. 18-20. A list of 89 scientific and common names, no more. No localities. All species listed by Hal B. Parks *et al* (*cf.* first article of this paper) are included, and the following in addition of special interest: *Gastrophryne texensis, Rana areolata, Hyla femoralis, Scaphiophus holbrookii holbrookii, Thamnophis s. sirtalis.* The list is apparently in large part a compilation.

1938. Idem. Edition 2: 1-51, ill. A few minor changes. A total of 94 species listed. Added are: *Holbrookia p. propinqua, Amyda mutica, Siren intermedia, Pseudacris nigrita occidentalis* and *Rana p. pipiens.* A few other names are brought more or less up-to-date as of then.

Potter, George E. and Sidney O. Brown

1941. Color changes in Phrynosoma cornutum. Proc. 24: 7. Summary of use of pitocin, pitressin and whole pituitary, each of which caused darkening. Adrenalin solutions caused blanching of *certain* chromatophores in absence of pituitary effect, producing a striking pattern.

*1942. Effect of sex and gonadotropic hormones on the development of the gonads in *Phrynosoma cornutum* during reproduction and non-reproductive phases. Trans. 25: 55-56. Estrogens reduce size of ovary; antuitrin-S reaction insignificant in non-reproductive period; testosterone reaction negative on eggs in reproductive season. Injection of estrogens in oil causes change from light to dark color.

Prather, John K.

1901. On the fossils of the Texas Cretaceous, especially those collected at Austin and Waco. Trans. 4: 85-87. A few fossil genera mentioned.

Sanders, Ottys

1938. Report on the collection of seventeen species of amphibians in Mexico. Proc. 21: 18-20. Seventeen species from the states of San Luis Potosi, Tamaulipas and Nuevo León. The best record is of *Triturus kallerti*, the second for the species (Villa Juárez, Tamaulipas).

Sawin, H. J.

1944. A restoration of the Triassic amphibian Buettneria. Trans. 27: 138. Four lines; relation to other metaposaurids and *Trimerorhachis*.

Strecker, John K.

1902. A preliminary report on the reptiles and batrachians of McLennan county, Texas. Trans. 4(2): 95-101. A list of 59 species, with a comment on the abundance of each.

Townsend, C. H. Tyler

1895. On the biogeography of Mexico, Texas, New Mexico, and Arizona, with special reference to the limits of the life areas, and a provisional synopsis of the bio-geographic divisions of America. Trans. 1(4): 71-96, pl. 2 (map). *Elaps*, p. 87 (Lower Rio Grande Valley). A very important paper; should be of wider circulation. Description of zones in numerous localities very valuable. Commentary on Merriam especially astute. Map to accompany the synopsis unfortunately did not appear in all volumes.

1897. On the biogeography of Mexico, Texas, New Mexico, and Arizona. II. Trans. 2(1): 33-86. A description of his trips and the life zones encountered in Mexico and the United States. A very useful account. Field notes, lists of insects and of a few reptiles. *"Lutainia" [sic] proxima* and *"Lu-*

tainia" vagrans [*?=marciana*] mentioned p. 79, apparently from the Brownsville area.

Wright, Albert Hazen and Anna Allen Wright
1938. Amphibians. Trans. 21: 1-38, pls. 1-3, figs. 1-6. Keys, statement of Texan range, habitat and breeding habits for 38 anurans and 23 salamanders known from or expected in the state. The illustrations emphasize key characters and general appearance of most of the anurans.

A Large Clutch of Eggs of *Chelydra serpentina serpentina* (Linnaeus)

By LEO CHARLES FINNERAN

Noting that some writers credit *Chelydra serpentina serpentina* with a brood of not more than forty eggs, it seems wise to record the following observation.

About eleven o'clock on the morning of June 13, 1941, a thirty pound female Snapping Turtle was disturbed in a strawberry lot, at Barron's Farm, Branford, Connecticut, where she was completing her nest. The discoverer removed her from the excavation and was about to take her home for the purpose of making turtle soup when the writer intervened and requested to "borrow" the creature on condition it be returned after ovipositing took place. This was agreed to and the turtle was transported to a sandpit, adjacent a large pond, where it was known that chelonians frequently lay their eggs. It was here that fifty-two eggs were deposited, between the hours of three and four, on that afternoon. They were laid at the rate of two a minute.

Upon later examination forty-six of the eggs were found to be fertile. Two were infertile. The remaining ~~forty~~-four hatched on September 2, 1941, giving an incubation period of eighty-one days.

9 HARBOR STREET, BRANFORD, CONN.

Desiderata. Mr. Herndon Dowling, U. of Fla., Gainesville, is working on *Seminatrix pygaea* and would appreciate observations or specimens, especially from Ga. and the Carolinas.

"UMWELT" is a handsomely illustrated magazine sponsored by the Biological Station of Wilhelminenberg; edited by Otto Koenig, Alle Wien XVI, Savoyenstrasse No. 1, Vienna, Austria; agency, Scholle-Verlag, Stubenring 6, Vienna 1, Austria.

Vol. 1, Dec., 1946, contains an illustrated account of some American poisonous snakes by Erich Sochurek; an illustrated anonymous note on two southern European lizards; a series of photos of *Testudo ibera,* depositing eggs. By Gilles and Trumler.

Natural Selection: "I have neglected to join the Herpetologists League because I now receive a much reduced salary which has necessitated my resigning from most of the organizations to which I have belonged and my giving up most of my subscriptions to scientific journals. However, I shall join your league and enclose three dollars."

Pseudacris clarkii and *P. n. triseriata* in Texas

By HOBART M. SMITH

Recent summaries of frog distribution have left in doubt the identity of the populations of the *triseriata* group of *Pseudacris* in eastern Texas, in spite of the fact that Burt (Amer. Midl. Nat., 17, 1936:775) has recorded *P. n. triseriata* from that area (Harrison and Henderson counties).

As early as February 2, 1946, calling frogs identified as *Pseudacris nigrita triseriata* were heard in the vicinity of Bryan, Brazos County, Texas. Their calls are not, to my memory, different from those I have heard of frogs of this subspecies in eastern Kansas and western New York. Brazos County specimens usually possess a lined pattern, typical of that race, and the only conspicuous variation is in distinctness of the lines. Some specimens appear unicolor. None has the spotted appearance of *P. n. nigrita* which may well enter extreme southeastern Texas and which has shared with *P. n. triseriata* a reasonable possibility of occurrence in this area.

On March 12, 1946, the calls of *P. clarkii* were heard 10 miles southwest of College Station, in Burleson County, Texas, on Farm Highway 60. They were later (March 24) heard there and at various points northward along Highway 50 in Burleson County to its junction with Highway 21, and thence northeastward along the latter in Brazos County. Calls were verified by specimens secured (1) 7 miles southwest (2) 10 miles southwest and (3) 15 miles west of College Station in Burleson County, and (4) 5 miles south of Bryan, Brazos County. These frogs were found calling in moderate abundance from small floating debris (dead grass and weed stems, fine twigs) in temporary pools in pastures where the water was at a maximum of some 10 inches in depth. To all members of the collecting parties the calls sounded different from those of *P. n. triseriata* with which all were familiar. The call of the latter species is a rapid succession of six to eight clear, clacking sounds steadily rising in pitch and lasting about ¾ of a second; the call is repeated at intervals of the same length as the call itself. The notes are uttered at a rate of frequency decreasing as the call is produced; the first few notes are so rapidly sounded that they are distinguished from each other with difficulty, while the last 2 or 3 notes are timed considerably farther apart. The effect can be reproduced in imagination as a finger nail is drawn over the ends of the tines of a pocket comb, while at the same time the comb is lifted rapidly from the bottom to the top of a tall glass jar.

The call of *P. clarkii* is similar in character to that of *P. n. triseriata*, consisting of a series of perhaps 6 to 8 clacking sounds produced with rising inflection. The call is much shorter and lower in pitch, however, and is repeated much more rapidly, at the rate of 23 calls in 15 seconds; the intervals between calls are about half the length of the calls themselves. The calls are uttered with considerably less volume than those of *P. n. triseriata* although the volume increases as the call progresses. The notes of the individual calls are sounded very close together, so that it is

extremely difficult to count them, and, contrary to the situation in *P. n. triseriata,* the final notes are actually closer to each other than are the preceding notes.

Live specimens proved to average smaller than *P. n. triseriata* and to have a spotted pattern of distinctly green, dark-edged markings (not slate stripes as in *P. n. triseriata*). Certain other characters were found to differ between the two forms as pointed out by Smith (Amer. Midl. Nat. 15, 1934: 462-463).

P. clarkii was heard to the exclusion of *P. triseriata* on highway 60 immediately west (within a few hundred feet) of the Brazos River and at, as well as between, the various localities previously listed. On the east side of the river on the same highway up to within a like distance from the river, only *P. n. triseriata* were heard. Apparently no overlap in geographic range occurs in that area; the river may act as a barrier. To the north, however, on Highway 21, *P. clarkii* occurs on the east side of the river at distances from the river varying from a few hundred feet up to 2 or 3 miles. This distribution corresponds with distribution of the soil types, for sandy soil extends to the river west of College Station, while northwest of Bryan an extensive flood plain has become deeply coated with silt and clay soil.

That this apparent soil preference is not rigidly adhered to is indicated, however, by the discovery of *both* species in a pool 15 miles west of College Station on Highway 50 five miles from its junction with Highway 60. Here, on clay soil, specimens of *P. clarkii* were obtained within a few feet of others of *P. n. triseriata.* An actual overlap of range in at least this area is thus proved, and since no tendency toward blending of the two forms near the Brazos River is apparent, it is at least indicated that intergradation is improbable.

For some time the correct status of *P. clarkii* has not been clear. It has been obvious enough that the range of the form overlaps that of *P. n. triseriata* in Kansas (Smith, *op. cit.*) and in Oklahoma (Bragg, Great Basin Nat., 4, 1943: 70-75; Wasmann Collector, 5, 1943: 129-140, figs. 1-4) but until now the possibility still remained that in Texas the two forms might intergrade. However, with the discovery of the natural occurrence of both forms together in Texas, typical in character, the probability of intergradation anywhere in its range with other forms seems completely negligible.

In summary, (1) these data verify Burt's record of the occurrence of *P. n. triseriata* in eastern Texas and extend the knowledge of its range there, suggesting that it is the form of *P. nigrita* to be expected throughout most if not all of that area; (2) the occurrence is recorded of *P. clarkii* in Brazos and Burleson counties, where in at least one area it occurs in the same pools as *P. n. triseriata,* and where both forms remain completely distinct as elsewhere in their ranges; and (3) conclusive confirmation is presented for Bragg's and others' opinion that *P. clarkii* is a species distinct from that to which *P. n. triseriata* belongs.

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